THE USER’S GUIDE TO
PTZ CAMERAS

Featuring:
- Ceiling or desk placement
- Image quality
- HD vs. SD
- Pan, tilt, and zoom operation
- Selecting the right solution

from the editors of ATECHNOLOGY
From courtrooms to classrooms, pan/tilt/zoom (PTZ) cameras are connecting scenes with a broader audience. Motor driven PTZ cameras can pan left and right, tilt up and down, and zoom in and out for close-up or wide-angle viewing.

FACTORS TO CONSIDER WHEN CHOOSING A PTZ CAMERA

From conference rooms and courtrooms, classrooms and operating rooms, pan/tilt/zoom (PTZ) cameras have made everyday scenes come to life. Motor driven PTZ cameras can pan left and right, tilt up and down, and zoom in and out for close-up or wide-angle viewing. PTZ cameras can be controlled by an operator or set to automatic mode where the camera moves through a programmed path to scan a specific area.
The flexibility of PTZ cameras, which can often be either desktop or ceiling mounted, provide a range of unique benefits in multiple applications. In the case of a telepresence application that utilizes a PTZ camera, the user’s experience can be as personal and effective as face to face meetings. Someone experiencing transparent telepresence could be able to behave, and receive stimuli, as if they were in the same room.

Since meeting participants do not usually remain stationary during a meeting, and their attention may deviate from a group of participants to notes on a whiteboard and back to an individual speaker, a PTZ camera is ideally suited to deliver the complete telepresence experience. Similarly, in a video conferencing application, PTZ cameras produce exceptionally high quality images with the ability to pan and zoom from speaker to speaker or to provide detailed views of the objects under discussion.

In house of worship applications, PTZ cameras can provide multiple views without the intrusion and expense of a camera operator. They are also easy to control without disrupting the services.

In distance learning applications, PTZ cameras allow professors to reach students around the globe while walking from the lectern to the blackboard and interacting with students within the classroom.

In industrial applications, PTZ cameras allow supervisors to monitor a factory floor of a manufacturing process, or zoom into a single process or worker for safety or quality control purposes. In remote justice applications, PTZ cameras can help reduce the municipality’s costs of prison transport for preliminary proceedings like arraignments.

In this article, we will discuss factors to consider when choosing a PTZ camera and detail how individual models in the Sony EVI® line can

The new EVI-H100S and EVI-H100V, which have a minimum focal length of 4.7, and horizontal viewing angle of 55.4 degrees are ideally suited for larger rooms and longer lens to target applications. As a highlight to the Sony SD line, the EVI-D100 has a minimum focal length of 3.1mm, and a wide-angle lens, which translates into a horizontal viewing angle of 65 degrees for video conferencing applications. In the HD line, the EVI-HD1, EVI-HD3 and EVI-HD7 all have a minimal focal length of 3.4 and a very wide horizontal viewing angle of 70 degrees. This makes these cameras suitable for small venues.
meet your specific requirements while delivering outstanding picture quality, durability, reliability, and return on investment.

CEILING OR DESKTOP?
One of the first things to consider when purchasing a PTZ camera is the camera mounting location and whether your application requires a desktop or ceiling mount option. In general, a small room with restricted space will require a higher field of view so the desktop option is preferred.

To the contrary, when installing a camera in a large area which requires a higher optical zoom, a ceiling mount camera is favored. Examples of these applications include houses of worship, classrooms, lecture halls, and factory and industrial monitoring.

When applications are more demanding and require multiple cameras installations, it is possible to combine the features and benefits of both ceiling and desktop mounted cameras.

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an E-flip feature that flips the images when the cameras are mounted on the ceiling.

**THE HEART OF THE MATTER: IMAGE QUALITY**

You buy a camera usually for one reason—a quality image. And that quality is derived from three components: the lens that zooms and focuses on the image, the image sensor that captures the image, and the digital signal processor (DSP) that processes the data received from the sensor. The Sony EVI line uses a range of high-quality, small form factor lenses that deliver up to 28x optical zoom in the SD line and a full 20x zoom in the latest HD cameras, along with varying levels of digital zoom.

When installing an SD camera to monitor operations within a factory, or into a large classroom, the EVI-D90 with its a 28x optical zoom lens is ideal. The high sensitivity EVI-D80 camera which offers 18x optical zoom is just the thing for an application with a demanding lighting criteria. Both of Sony’s new universally mountable (desk-top or ceiling) HD EVI cameras, the EVI-H100S and EVI-H100V, offer 20x optical zoom which are a perfect fit for small to mid-size rooms.

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**CCD OR CMOS? BOTH!**

Image sensors convert the light coming through the lens into a usable signal; CCDs (charge coupled devices) output an analog signal that must be converted to digital by other camera components, and CMOS (complementary metal oxide semiconductor) chips output a digital signal. With CCDs, most of the chip’s circuitry is devoted to capturing the incoming light; sensitivity and the resultant output quality are very high. CMOS chips are highly integrated and power-efficient. They can reduce the overall camera’s size, and typically capture the highest resolution images.

Sony continues to develop both CCDs and CMOS imager chips, with each new iteration enhancing quality and performance. Sony’s new Exmor™ High-Speed CMOS Sensor incorporates advanced-quality image sensor technologies and expertise accumulated through the development
of CCDs to improve the light sensitivity and quality of the Exmor chips.

Sony’s latest CCD and CMOS sensors are more sensitive than those incorporated into previous generations of EVI cameras, and use the latest progressive scan video imaging technology. Sony increased the size of the photodiode that captures the light, and shrank the wiring layer between the lens that focuses the incoming light and the photodiode. These advancements enable each pixel to capture more light with less waste, increasing overall sensitivity, and capturing high levels of detail and color information.

The final piece of the puzzle is the DSP, which ingests the raw data from the CCD or CMOS chip and processes it into a high quality image in the selected output format. Along the way, the DSP can perform various functions, including but not limited to, white balance and exposure adjustments, sharpness enhancement and noise reduction. Sony is well known for its DSP technology, image quality, and reliability.

Sony’s unique combination of a high quality lens, imaging device, and DSP ensures that no matter which EVI model you choose for your demanding application, image quality will be outstanding. With this as background, let’s focus on some of the other factors that you should consider when choosing a PTZ camera.

**HD VS. SD**

As industry trends support, most PTZ-related markets are transitioning to HD. However, SD is still very popular for applications with less demanding resolution, narrow bandwidth and legacy system requirements. When considering a SD application today it is advisable to take note of an upgradeable path to HD for the future. An ideal candidate would be an HD camera with a user selectable format that can still provide a SD signal. In the long run, selecting a camera with a clear and concise migration path that parallels with industry trends to HD can help reduce your long-term capital costs.

If you’re new to HD, it’s important to understand that there are multiple formats, which can be confusing, particularly with nomenclature like 1080i/60 or 720p/30. Typically, the first number is the height of a complete frame of the video. All HD video has a 16x9 display aspect ratio, so 1080 translates to 1920 (H) x1080 (V) resolution, and 720 translates to 1280 (H) x720 (V).

The designation of an “i” or “p” relates respectively to interlace and progressive scan video. Interlace video is captured in fields, two for each frame, one field capturing even lines, the next odd lines, and creates an interlaced frame. In contrast, with progressive scan video each frame is captured in its entirety, which is appropriate for display on computer screens and other LCD display devices, and ideal for most compression technologies.

The final designation relates to frame rate. In the above example 60 translates to 60 fields per second, while 30 translates to 30 full frames per second.

All of Sony’s recently announced EVI cameras, which include the EVI-H100S and EVI-H100V high-definition cameras, and the standard definition EVI-D80 and EVI-D90 cameras, can be desktop or ceiling-mounted, with an E-flip feature that flips the images when the cameras are mounted on the ceiling.
second. When it comes to selecting frame rate consider your system requirements and limitations, application particulars and consult your industry professional.

When it comes to installation, system compatibility is paramount. Ensure that the PTZ camera you select is compatible with your system of choice. Most cameras support one or more of three connection types: HD component, HD-DVI and HD-SDI. Each of these industry standards have positive aspects in regards to transmission, conversion and recording mediums. Whether your application is telepresence, remote monitoring or distance virtual communication, one of these industry standards can optimize your demanding installation requirements.

If your connection needs may change in the future, consider a camera like the EVI-HD1 that supports multiple HD outputs, analog component and HD-SDI. The EVI-HD1 also supports NTSC and PAL SD capture, with both VBS and Y/C video outputs.

**PAN, TILT, AND ZOOM OPERATION**

While all PTZ cameras can pan and tilt, the mechanisms driving the pan and tilt operations are not created equal. All models in the EVI series utilize a motor mechanism for achieving high-speed, quiet and smooth PTZ operations to capture images. The cameras cover a wide area

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and are ideal for capturing extensive scenes in that area. When comparing PTZ models, make sure that the range of pan and tilt, and the speed of those motions, is sufficient for your application. Sony EVI models can smoothly and quietly pan at up to 340 degrees and tilt at 120 degrees, which should be sufficient for your demanding camera deployment criteria.

FIELD OF VIEW
Beyond PTZ controls, you should also assess whether the camera’s field of view, also called the horizontal viewing angle, can incorporate all required content. Field of view depends on the type of lens used (wide, macro, normal, telephoto/zoom) and it has an inverse relationship with the focal length of the camera. This becomes critical when lens to target distances vary and wide angle viewing is essential.

As a highlight to the Sony SD line, the EVI-D100 has a minimum focal length of 3.1mm, and a wide-angle lens, which translates into a horizontal viewing angle of 65 degrees for video conferencing applications. In the HD line, the EVI-HD1, EVI-HD3 and EVI-HD7, all have a minimal focal length of 3.4 and a very wide horizontal viewing angle of 70 degrees. This makes these cameras suitable for small venues. The new EVI-H100S and EVI-H100V, which have a minimum focal length of 4.7, and horizontal viewing angle of 55.4 degrees are ideally suited for larger rooms and longer lens to target applications.

LUX RATING
By way of background, 1 lux equals the light falling on a one-square-meter surface from a candle located one meter away. A camera’s lux rating relates to its ability to discern high quality images in low light. In varying lighting conditions or low light environments it is critical to note a camera’s minimum lux rating.

A camera’s lux rating designates the lowest lux value within which the camera can produce an acceptable image. However, this rating is subjective and set by the camera manufacturer, so a
rating of 1 lux may mean different things from different vendors.

Sony adds objectivity to the lux rating of their EVI cameras by specifying the lux rating, aperture and IRE level, which details the amount of light necessary to produce the stated IRE level using the designated aperture setting. For example, in High Sensitivity Mode, the new EVI-D90, which produces 0.65 lux at 50 IRE at an aperture setting of 1.35, and the EVI-D80, which produces 0.4 lux at 50 IRE at an aperture setting of 1.4.

In addition to the two Sony HD cameras designated earlier, Sony offers two SD cameras with similar performance; the new EVI-H100S and EVI-H100V cameras produce 0.5 lux at 50 IRE in High Sensitivity Mode, and 1.7 lux at the same IRE value in normal mode.

CONTROL AND OPERATION
Prior to finalizing your camera selection, determine how much or how little operator interface and control of the camera you will need. Sony cameras offer flexibility by providing automatic settings under various conditions as well as allowing for manual control for greater operator interface. Sony cameras can automatically select the parameter for ultimate picture quality or allow you to customize operations when and as needed.

Most PTZ cameras offer automatic and manual white balance, which are often supplemented with indoor and outdoor presets. One key feature in Sony’s newest EVI cameras, called Auto Tracking White (ATW), adds additional flexibility. While auto white balance sets the correct color temperature for a particular shooting environment or color temperature, ATW adjusts camera color temperature to any variance in environment conditions dynamically.

Imagine in a video conferencing application that a participant turns on an incandescent lamp, changing the color temperature of the prevailing light source. Automatic white balance would not correct for this, while ATW would, helping to maintain optimal quality even under changing conditions.

EXPOSURE
Regarding exposure, most PTZ cameras offer fully automatic modes, plus manual controls over shutter speed, aperture and gain. For superior control over depth of field and/or picture clarity, you should also insist upon shutter and aperture priority modes, plus exposure compensation so you can adjust brightness in all automatic or semi-automatic modes. Also helpful are modes like

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backlight compensation, which produces optimal exposure on a subject framed by very bright lights.

Cameras operating under a range of lighting conditions also benefit from features like low illumination chroma suppress mode, which reduces color saturation in low light, reducing chroma noise. Another useful low light-related feature is Auto ICR Mode, which automatically removes the infrared cut filter to improve low-light sensitivity, and restores it when a preset or user defined level of brightness is achieved, improving picture quality in normal light.

To assist your installation and hands-on camera configuration, check whether the cameras you are considering include an IR remote commander unit, and determine which configuration options it can control. Sony supplies an IR remote commander unit with every EVI model. Also make sure that all operation controls, from PTZ functionality to exposure and white balance adjustments, are accessible via an industry standard, comprehensive and well-documented control protocol. In this regard, all EVI cameras support Sony VISCA™ protocol, an RS-232C/RS-422 interface that provides for easy connectivity to a variety of peripheral products, with exceptional fine-tuning capabilities for all camera features.

Another feature to look for is memory backup of presets for your selected camera presets, including AE mode, white balance as well as presets for pan/tilt/zoom and focus positions.

**CHOOSING A PARTNER**

We’ve explored PTZ cameras feature by feature, but camera performance and reliability relates to overall construction and Sony stands behind this. In this regard, in the unlikely event of a camera failure, all Sony EVI cameras are backed by a one-year parts and labor warranty. Sony’s EVI product line is ideal for a diverse range of applications where imaging excellence, proven reliability, and ease of installation are key.